NC 54/I-40 CORRIDOR STUDY

TRANSPORTATION-LAND USE MASTER PLAN

EXECUTIVE SUMMARY

DECEMBER 2011

Durham-Chapel Hill-Carrboro
Metropolitan Planning Organization

Edited by the DCHC MPO in April 2012 to capture feedback from the public during the public comment period.
All edits to the Executive Summary are referenced in the text and included in the Executive Summary Addendum at the end of this document.

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ICF INTERNATIONAL

Executive Summary

Overview

A primary route connecting much of southern Orange, Durham and Wake Counties, as well as new growth occurring in Chatham County, with the academic and medical destinations at the University of North Carolina at Chapel Hill (UNC) and other destinations in Research Triangle Park, the NC 54/I-40 corridor is facing pressures unlike many others in the region. In addition to the regional access that NC 54 provides for UNC and its medical facilities for commuters, patients and visitors from across the state and region, the corridor is experiencing adjacent land development changes that require careful planning with transportation improvements to serve the long-term vitality of the corridor and its surrounding neighborhoods. With environmental, physical and policy constraints limiting expansion of portions of the roadway and the development of parallel roadway connections, the corridor requires a multimodal solution to meet future demand while improving safety for all users and traffic operations.

"NC 54 is an extremely complex corridor, involving multiple travel markets with each having unique characteristics and needs."

The NC 54/I-40 corridor is extremely important to the communities in both Durham and Chapel Hill, where it serves residential, commercial and institutional land uses, creating an eclectic mix of local and regional traffic competing for limited space. The corridor is fast becoming the most congested in the region, and has begun a transition from low-density suburban development with a semi-rural feel to a more urban pattern, with approved and pending development proposals expected to accelerate that transition as the economy rebounds. With more than 600 acres of vacant developable land surrounding it and likely development and infill of the future light rail station areas, NC 54 is poised for dramatic changes. As a result, the corridor is rising in statewide importance and regional prominence.

However, rising congestion levels threaten property values and economic growth for both jurisdictions, as well as the ability for UNC to compete for jobs and patients. There are policies in place in Chapel Hill and on the UNC campus that restrict the amount of available parking, and encourage the use of transit in reaching destinations served by this corridor. Yet the heavy traffic, high speeds and lack of multimodal facilities along the corridor create barriers that limit the usefulness and safety of walking and bicycling for transportation. This also influences transit usage, where heavy demand exists due to the parking constraints, but better pedestrian access is needed to make transit more effective as a travel option. As a result of those existing and anticipated future demands, NC 54 is an extremely complex corridor, serving multiple travel markets and a diverse array of stakeholder and community interests focused on the success of different transportation modes, protection of neighborhoods and the economic viability of their land.

Study Objectives

In that context, the Durham-Chapel Hill-Carrboro Metropolitan Planning Organization (DCHC MPO) initiated the NC 54/I-40 Corridor Study to develop a land use – transportation blueprint for this regionally significant corridor. With its development potential and the plan to construct a regional light rail system that would serve this corridor, the goal of the study is to define complementary land use and transportation strategies that will guide public and private actions, investments and capital project priorities to improve mobility, safety and access for all modes. The dynamic nature of this critical corridor requires a bold vision supported by practical, achievable strategies in the near term and set the right foundation for longer term improvements through the 2035 horizon year.

Through a planning process that examined future land use-transportation scenarios, the NC 54/I-40 Corridor Study seeks to build upon various transportation and land use plans and engage corridor stakeholders and the public in finding solutions that are effective and find the right balance between mobility and accessibility for all users. Study recommendations in the final report offer a multimodal approach to meeting existing and future transportation needs. They address the functional design for specific geometric improvements at intersections along NC 54 and at the interchanges with I-40 and US 15-501, the expansion and integration of various types of transit services to help more people reach their destinations as an alternative to driving, an interconnected network of bicycle and pedestrian facilities to provide a more comfortable environment with safe access along the corridor for walking and cycling, and a phased implementation plan for capital projects and service improvements.

These transportation recommendations support a land use strategy designed to create more opportunities for location-efficient housing and transportation in the corridor to improve livability and regional mobility. The corridor is becoming increasingly employment-oriented, and more proximate housing choices – particularly for a range of income levels – will create shorter trip distances and help make the use of non-auto travel options more viable. The report includes design guidelines to provide further support for implementing the recommended land use and transportation strategies.

Study Partners and Process

The DCHC MPO led the study, serving as the project manager in partnership with the consultant team hired for the project, Renaissance Planning Group, in association with ICF International and Michael Baker Corporation. The MPO coordinated the active involvement of a broad group of study partners that include the North Carolina Department of Transportation (NCDOT), Triangle Transit Authority (TTA), the City of Durham, Durham County, the Town of Chapel Hill, the University of North Carolina at Chapel Hill (UNC), Chapel Hill Transit (CHT) and the Durham Area Transit Authority (DATA). The MPO, the City of Durham, Durham County, and the Town of Chapel Hill funded the study. The study partners formed a steering committee that met monthly to guide the process, provide input at key milestones, and review study work products.

While the NC 54 corridor study limits are from I-40 to US 15-501, the study did not just focus on the linear right-of-way along NC 54. It captured a regional context, including growth patterns, transportation plans and the planned regional light rail system anticipated to connect this corridor to other points in the Triangle Region. The study area boundaries encompass surrounding neighborhoods and the existing and planned street networks, including Ephesus Church Road, Barbee Chapel Road, Farrington Road, NC 751 and others providing parallel routes or interconnecting with NC 54.

Public engagement is critically important to the study. A part of the corridor's complexity is the multitude of interested stakeholders with diverse expectations about the future of the NC 54 corridor. These include landowners, institutions, businesses, neighborhood

residents, students and, of course, the commuting public. A vigorous public participation process was employed to guide the development of study recommendations. This entailed a series of in-depth focus group discussions with each of the key stakeholder groups (residents and non-residents alike) early in the project and again once initial recommendations were nearing completion. In addition, a series of three public workshops at key milestones defined priority issues and opportunities, provided the basis for creation and evaluation of scenarios, and enabled participants to react and suggest refinements to draft land use and transportation master plan recommendations.

These outreach activities were augmented through use of a project web site (http://www.nc54-i40corridorstudy.com/) to share information and provide additional opportunities for the community to review materials and weigh in with ideas or issues of concern. The DCHC MPO staff and consultant team also met informally with various individuals and groups throughout the study. The recommendations contained in this report are a direct reflection of the input provided over the entire public engagement process.

Vision for the Corridor

Through the study process, analysis and broad-based feedback, a vision emerged for a regionally significant multimodal corridor that serves both regional and local travel through an expanded and more efficient network of streets, bus routes, bicycle facilities and pedestrian enhancements. The integrated land use and transportation vision is to promote community livability by guiding future development into targeted mixed-use areas to reduce trip lengths, enable greater use of non-auto travel options and provide location-efficient choices for housing and transportation. These areas are within ¼ to ½ mile of the four planned light rail stations in the corridor. This will effectively support the investment in rail passenger service that will strengthen regional and local travel options between the UNC campus, Orange County, Durham County and elsewhere in the Triangle Region. Over time, the centers help transform the corridor from a drive-by strip into highly accessible, well-connected places that function as vibrant focal points serving local and regional needs.

The NC 54 Corridor Master Plan promotes location-efficient decisions to help lower combined housing and transportation costs per household. It puts people together, served by a more efficient transportation system that enables more trips to be made by walking, bicycling and transit. The plan defines target growth areas that help reduce sprawl in outlying areas.

Land Use Strategy

Figure ES-1 presents the recommended nodal development vision for the corridor. This land use-transportation blueprint embraces livability principles that provide more transportation choices, promote equitable, affordable housing through location and energy-efficiency, enhance economic competitiveness through reliable and timely access to employment, educational opportunities and services, and by supporting existing communities through transit-oriented, mixed-use development that will help safeguard existing neighborhoods and preserve rural landscapes.

Table ES-1 shows the proposed height and density targets for the nodal development plan, which provides the compact, mixed-use framework necessary to create a series of vibrant walking districts that enables reliance primarily on non-auto travel modes as they approach build-out of the development program.

The creation of highly developed mixed-use centers can help mitigate automobile travel demand by creating an environment where walking and access to transit are priorities. It also provides a mechanism to advance transportation funding opportunities that are unlikely to be available with the status quo or trend development pattern. For instance, more intense development at the planned Leigh Village station and other "nodes" along the corridor can provide incentive to obtain mitigation funding from future development to offset transportation costs for the roadway improvements that eventually will

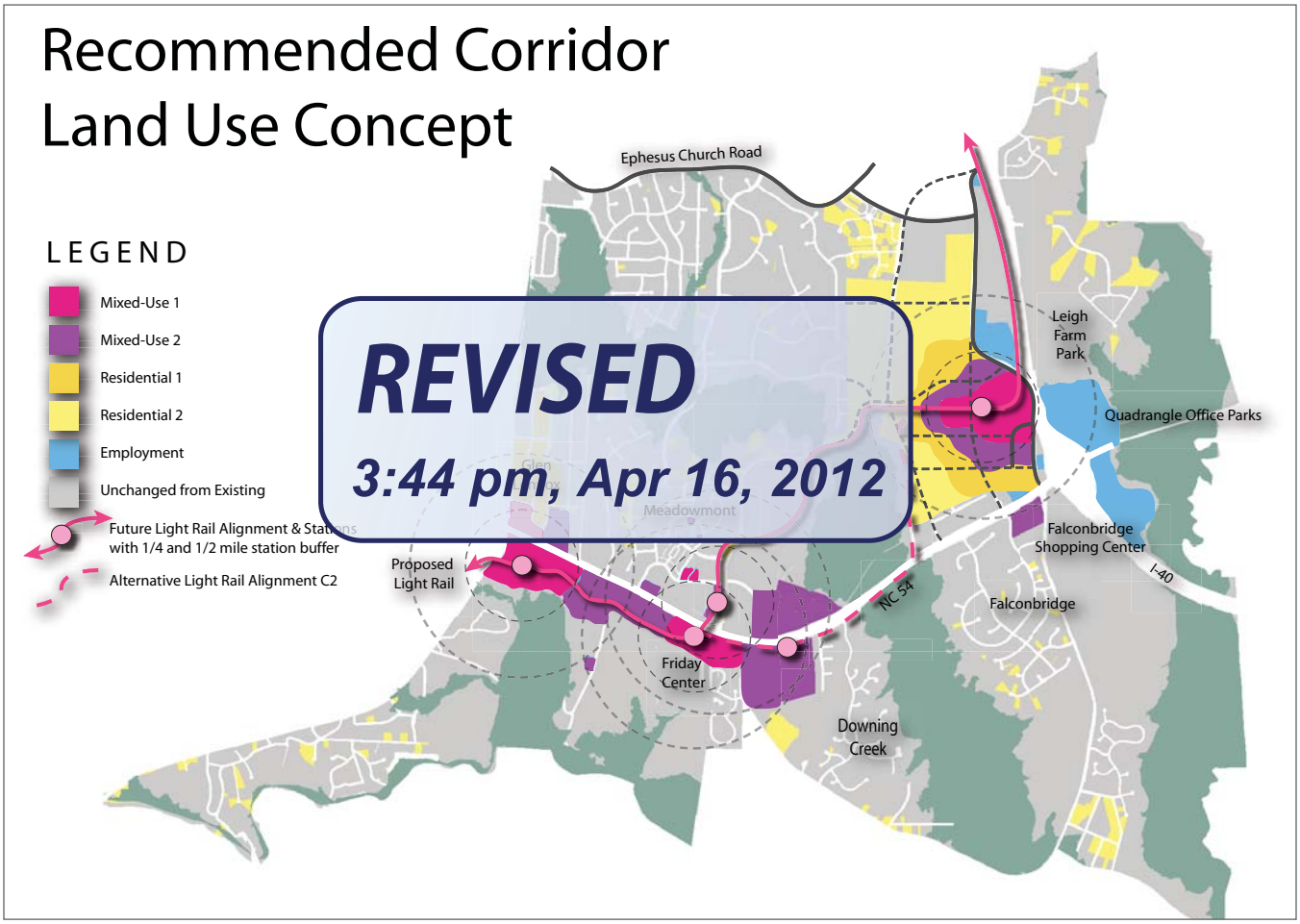

Figure ES-1: Recommended Corridor Land Use Concept

See Addendum #1 for revised figure

Table ES-1: Concept Land Uses

	Mixed Use 1	Mixed Use 2	Residential 1	Residential 2	Employment
No. of Stories	3 - 8	2 - 4	2 - 4	1 - 3	4 - 12
Floor-to-area ratios (non-residential)	1.25 - 2.25	1.0 - 1.5	-	-	0.5 - 1.0
Dwelling Units per Acre	35 - 60	20 - 35	12 - 35	6 - 12	-
Employees per Acre	45 - 90	25 - 50	9 - 15	6 - 12	35 - 175

be needed in the corridor even without the development. The traffic projections for the MPO's adopted 2035 Long Range Transportation Plan – without the nodal development plan in the NC 54 corridor – show that major capacity improvements to NC 54 and I-40 will be needed. Higher densities also enable developers to incorporate a greater percentage of workforce housing into the development program, helping to shorten trip lengths and creating more purchasing power for those residents who can effectively lower both housing and transportation costs.

See Addendum #2 for inserted text

Transportation has a profound influence to shape growth in a region and along a corridor. The parking constraints on the UNC campus and elsewhere in the Town of Chapel Hill have certainly influenced the use of transit, and, at least to a certain extent, where people choose to live. Developers and their clients (businesses, residents) respond to transportation conditions when they decide where to build, live, or locate their business. A new or improved roadway or transit project can make access to a location easier – making it more attractive to develop. A transportation improvement can also improve visibility – an important consideration for commercial developers. Many businesses rely on being seen by "pass-by" traffic and want to locate where there is a lot of vehicle and/or pedestrian traffic. This has been the case at the NC 54/Farrington Road intersection, where development depends on highway visibility. Conversely, rail transit is likely to result in more compact development clustered within walking distance of the station, and opens up new opportunities for how people choose to live and travel.

The response is also strongly influenced by the land use policy and planning context – for example, when the predominant mode of travel is the automobile, rail transit needs to be accompanied by strong land use policies in order to concentrate development in station areas. This type of strategy in the NC 54 corridor is necessary to avoid a future scenario where rising levels of congestion will occur due to regional growth forecasts, and the demands placed on the NC 54 corridor and its interchange with I-40 will lack any financial support from planned development.

The timing of the nodal development plan is dependent on the schedule for light rail in the corridor. If the funding mechanism is approved and the light rail plan moves forward, detailed station area plans would guide the development for the areas around each station in the corridor. Due to the roadway capacity constraints of this corridor, only relatively modest increases in development intensity can be supported until the light rail system is operational.

Transportation Strategy

Table ES-2 presents the phased multimodal transportation recommendations associated with the recommended nodal development plan. The recommendations are divided into short-term, mid-term and long-term strategies. These are described in detail in the full report, with supporting data in a series of appendices. In general, the short-term roadway strategies consist of a series of local street connections including the collector streets to provide alternate routes for local trips and improve traffic flow and operational efficiency.

The interim components include reconstruction of the I-40 interchange, where the critical intersection of Farrington Road and NC 54 causes significant congestion due to its proximity to the I-40 interchange, grade separation to eliminate traffic signals at the most critical intersections, and unconventional intersection designs commonly referred to as "superstreets." Together these strategies will reduce delay and support anticipated traffic growth in the corridor.

Longer term, with the recommended nodal development, a redesign of the US 15-501 interchange at NC 54 will be needed, and can enhance bicycle and pedestrian safety in the future Hamilton Road light rail station area.

Transit is an integral part of this overall strategy. In addition to the planned light rail system, a network of premium Bus Rapid Transit lines, expanded local bus service, and additional park-and-ride lots are recommended for the corridor. The key park-and-ride strategy is the implementation of multiple facilities north and east of the NC 54/I-40 interchange to capture trips

before they enter the corridor. The package of facilities will together serve regional commuters, latent demand for satellite parking, and future parking for light rail transit, and could provide an alternative to the Friday Center lot should it redevelop in the future.

From a bicycle and pedestrian network standpoint, the recommended plan fills in gaps and improves safety and access along NC 54 through geometric modifications and the creation of a 15' shared use path adjacent to the roadway between Barbee Chapel Road and the I-40 interchange. This is a critical gap in the corridor, and high speed traffic precludes an on-road solution for the section east of the Friday Center. Additional non-motorized transportation recommendations are identified throughout the corridor, including along Barbee Chapel Road and at US 15-501.

The roadway improvements, especially the superstreet intersection design and partial cloverleaf interchange design at US 15-501, take advantage of existing infrastructure and will provide maximum capacity for the cost of construction. The transportation recommendations for other modes will help to manage demand in the corridor, further extending the life of the roadway improvements. The recommendations for each mode are linked to others, to support a well-balanced and inter-connected mobility network. Each improvement is an investment in another, and together will build a stronger system for mobility than optimizing the network for one particular mode.

The Durham-Orange County Corridor Alternatives Analysis (AA) was conducted concurrently with the NC 54/I-40 Corridor Study. The AA recommends two light rail alignments be carried forward to the PE/NEPA phase within the NC 54/I-40 study area. Both alignments, shown in **Figure ES-1**, recommend elevated crossings over NC 54. Alignment C1 will have no adverse impacts along the NC 54 corridor. Alignment C2 may cause complications at the Barbee Chapel Road intersection with NC 54, where the proposed C2 alignment crosses Barbee Chapel Road just south of NC 54. With the current intersection configuration, an at-grade light rail crossing will likely not result in significant traffic impacts beyond the congestion that already exists or will exist in the future without substantial intersection capacity improvements. Constructing a grade-separated interchange at Barbee Chapel Road will ease congestion and lessen delays as traffic grows in the future. A grade-separated interchange at Barbee Chapel Road could likely be designed to accommodate the C-2 light rail alignment, but may entail significantly higher costs for extending the elevated segment of the light rail and a potential tri-level structure. Another option for the C2 alignment would be to move the alignment further to the south to avoid conflicts with the proposed ramp. These additional costs will need to be considered in the next phase of the Light Rail development process.

The potential construction of the C2 alignment and the potential development of the Lloyd property on the north side of NC 54 would likely generate high pedestrian demand across NC 54. This would be located just slightly east of the future elevated crossing that would be constructed at Barbee Chapel Road. While crossing at Barbee Chapel Road would still provide access to the Hillmont light rail station within a half-mile walk of the Lloyd property, a more substantial direct pedestrian crossing may be needed. This is another cost implication that should be considered in the EIS process.

See Addendum #3 for clarification

Conclusion

The analysis of growth and transportation indicates that substantial capacity improvements will be needed by 2035 with or without new development anticipated to occur in the corridor. The I-40 interchange at NC 54 is fast approaching its capacity, and the proximity of the Farrington Road intersection creates operational challenges that affect much of the corridor. Heavy through traffic volumes projected along the corridor require intersection modifications that will help reduce delay. While the planned light rail transit system will help when it becomes operational sometime around 2025, it will not eliminate congestion. Rather, the light rail network provides a sound basis to guide future growth into the planned station areas as part of a nodal development strategy that will help reduce trip lengths, lower vehicle miles traveled per capita, and provide for more location-efficient housing choices to increase the financial flexibility of those residents.

While the recommended land use plan increases growth in the corridor beyond the levels assumed for the adopted Long Range Transportation Plan, most of that additional growth is expected to occur in Orange County because the LRTP assumptions appear low relative to development potential and future plans.

The recommended phasing plan for the transportation network creates better mobility for the next 25 years through a series of improvements to enhance local street connectivity for alternate routes, relieve bottlenecks at key interchanges and intersections through grade separation, and increase operational efficiency through "superstreet" intersection treatments.

As indicated, due to traffic impacts, much of the potential future growth will need to wait until the light rail system is operational and can help moderate auto travel demand. However, the plan calls for expanded park-and-ride opportunities north and east of the NC 54/I-40 interchange to serve regional commuters, satellite parking for nearby employment centers, and future light rail transit station by capturing a reasonable share of single occupancy vehicles before they enter the corridor. Expanded local bus, Bus Rapid Transit, and commuter express routes are planned to meet the corridor's growing needs in the interim to light rail, and these services will complement the rail system when it is built.

A network of non-motorized transportation facilities, along with signage/markings for shared on-road use where appropriate, is needed to create a more accessible corridor and study area. This addresses travel along the NC 54 corridor by bicyclists and pedestrians, as well as crossing the corridor safely and efficiently. Elsewhere in the study area, the network provides additional connections between residential areas, commercial destinations and regional facilities, such as the American Tobacco Trail.

Establishing benchmarks and targets is an effective way to measure progress toward plan implementation. The NC 54/I-40 Corridor Study is a multi-year, multi-phase master plan aimed at improving overall mobility and accessibility, consistent with plans to create development focal points as places that become multipurpose destinations. Given the concerns of some residents and many stakeholders about traffic conditions and future development plans, it makes sense to take an approach in partnership with NCDOT and the local governments that addresses various aspects of this report to track progress toward achieving outcomes of this planning effort, not merely the programming and construction of capital projects.

The recommended approach is for the MPO to prepare a biannual monitoring report every two years to document progress toward achieving the mobility goals outlined in this study. This monitoring report would document transportation system conditions over time using the performance measures defined through this study and expanded to address specific implementation activities and accomplishments on the part of each study partner or jurisdiction. The report would fit within the MPO's established Congestion Management Process, and should document actions from a land development, transportation and urban design framework to implement the recommendations for improved livability, mobility, safety and access.

Table ES-2: List of Transportation Recommendations

PARK-AND-RIDE					
Description	**Location**	**Jurisdiction**	**Phase**	**O&M**	**Capital**
Coordinate with retailers to designate 50 shared park-and-ride spaces. Enhance TTA 805 service through Woodcroft.	Retail Center at NC 751/ NC 54 Intersection[1]	Durham	Short Term (2012-2020)	$565,000[2]	n/a
Construct surface lot with 500 spaces. Implement a new CHT express route (or modify CHT Routes D and DX to serve facility. Extend Danziger Drive over I-40 for additional access.	Gateway Center Future Light Rail Station	Chapel Hill	Short Term (2012-2020)	$565,000[2]	$3,555,000 [3,4]
Coordinate with retailers to designate 300 shared park-and-ride spaces. Extend existing CHT DX route to serve facility.	Patterson Place	Durham	Short Term (2012-2020)	$565,000[2]	n/a
Coordinate with retailers to designate 100 park-and-ride spaces for carpool and vanpool.	Retail Center at Governors Village	Durham	Short Term (2012-2020)	n/a	n/a
Coordinate with retailers to designate 160 park-and-ride spaces. Add a stop along TTA Route 405 to serve facility.	Oak Creek Village	Durham	Mid Term (2020-2025)	$565,000[2]	n/a
Coordinate with retailer to replace or expand existing facilities in Southpoint Mall. Modify TTA and DATA routes as necessary.	Renaissance Parkway Target Store	Durham	Mid Term (2020-2025)	$565,000[2]	n/a
Construct small facility with up to 500 spaces after construction of I-40 interchange improvements. Provide express bus service if constructed before light rail.	Leigh Village Future Light Rail Station	Durham	Long Term (2025-2035)	$565,000[2]	$10,000,000[5]
Convert surface lot into structured facility with 1,000 spaces.	Gateway Center Future Light Rail Station	Chapel Hill	Long Term (2025-2035)	n/a	$20,000,000[5]
Construct structured parking facility with 1,000 spaces to service light rail station.	Patterson Place	Durham	Long Term (2025-2035)	n/a	$20,000,000[5]
Implement CHT express route	Retail Center at Governors Village	Durham	Long Term (2025-2035)	$565,000[2]	n/a

See Addendum #4 for updated information

1 The pursuit of several locations for a park-and-ride facility along NC 751 is recommended, including Southpoint Auto Park Boulevard and the Renaissance Parkway Target Store. The retail center at the NC 751/NC 54 intersection represents an ideal location, but all three locations should be pursued.

2 Operating costs based on additional total annual hours multiplied by $86, with 15 minute frequency during peak hours and 30 minute frequency during off-peak hours

3 Assumes $5,000 per space, the average surface parking construction cost from the National Parking Association's 2009 study Parking in America: Annual Review of Parking Rates in the United States and Canada

4 Includes cost of two new buses based on a 50/50 split of $400,000 non-hybrid buses and $655,000 hybrid buses for an average of $527,500 per bus

5 Includes cost of multi-level parking structure at $20,000 per space.

TRANSIT					
Description	**Location**	**Jurisdiction**	**Phase**	**O&M**	**Capital**
Expanded Local Bus service with 30 minute frequency	Southeast along Barbee Chapel Rd and returning north back to NC 54 along Farrington Rd with transfer to regional service	Durham	Short Term (2012-2020)	$1,355,400[1]	$700,000 (2 buses at $350,000 each)[2]
Express Bus service along NC 54 from the NC 751 park-and-ride facilities	From NC 751 park-and-ride facilities to downtown Chapel Hill along NC 751 and NC 54	Durham & Chapel Hill	Short Term (2012-2020)	$1,355,400[3]	$700,000 (2 buses at $350,000 each)[2]
Express bus service us service along US 15-501 or Franklin St from the Gateway Center park-and-ride.	From Gateway Center at the I-40/US 15-501 interchange to downtown Chapel Hill along US 15-501 or Franklin St	Chapel Hill	Short Term (2012-2020)	$1,355,400[3]	$700,000 (2 buses at $350,000 each)[2]
Light Rail Transit Preliminary Engineering and Design	Durham to Chapel Hill	Durham & Chapel Hill	Mid-Term (2020-2025)	n/a	n/a
Expanded Local Bus service with 30 minute frequency	North of NC 54 along Farrington Rd & SW Durham Dr to US 15-501 (Durham- Chapel Hill Blvd)	Durham	Mid-Term (2020-2025)	$1,355,400[1]	$700,000 (2 buses at $350,000 each)[2]
Bus Rapid Transit - Phase 1. Five minute frequency with daily peak vehicle need of six buses	From Meadowmont along NC 54 to downtown Chapel Hill	Chapel Hill	Mid-Term (2020-2025)	$11,566,080[4]	$3,400,000
Bus Rapid Transit - Phase 2. Five minute frequency with daily peak vehicle need of six buses.	From NC 751 park-and-ride facilities along NC 54 towards Chapel Hill, aligning with Bus Rapid Transit - Phase 1	Durham	Mid-Term (2020-2025)	$11,566,080[4]	$3,400,000
Flex Route service	General service north and south of study area along Barbee Chapel Rd, Pinehurst Dr, Farrington Rd, Ephesus Church Rd, serving the Falconbridge Community, Downing Creek community, and Glen Lennox	Chapel Hill	Mid-Term (2020-2025)	$4,066,200[5]	$307,200 (4 buses at $76,800 each)[2]
Light Rail Transit (Final Design and Construction)	Durham to Chapel Hill	Durham & Chapel Hill	Long Term (2025-2035)	TBD[6]	$2,750,000[2]

1 Operating cost for normal fixed route service with 30 minute frequency is based on Long Range Transportation Plan.

2 Source of vehicle cost is 2011 Transportation Improvement Program.

3 Operating cost for express bus service is based on the operation of a fixed route service, but at a higher frequency.

4 Bus Rapid Transit costs are based on the 2009 Long Range Transit Plan study conducted by the Town of Chapel Hill. They include the cost of roadway improvements.

5 Flex Route costs are based on the normal operations of a fixed route service. Flex service is essentially the same type of service, only different in the method of delivery.

6 Operating cost estimates for the light rail project cannot be provided. The project has a more complete analysis and cost estimated being conducted by Triangle Transit. The current cost for this project is limited to an estimate of preliminary engineering and design.

PEDESTRIAN AND BICYCLE				
Description	**Location**	**Jurisdiction**	**Phase**	**Cost[1]**
Install crosswalks and pedestrian signals at signalized intersections with pedestrian refuge islands and street lighting for crossing NC 54.[2]	Burning Tree Dr/ Finley Golf Course Rd & NC 54	Chapel Hill	Short Term (2012-2020)	$80,000
	W Barbee Chapel Rd & NC 54	Chapel Hill	Short Term (2012-2020)	
	Meadowmont Ln/ Friday Center Dr & NC 54	Chapel Hill	Short Term (2012-2020)	
	E Barbee Chapel Rd & NC 54	Chapel Hill	Short Term (2012-2020)	
	Huntingridge Rd & NC 54	Durham	Short Term (2012-2020)	
	Farrington Road (northern, southern and eastern approaches) & NC 54	Durham	Short Term (2012-2020)	
	Leigh Farm Rd/ Quadrangle Dr & NC 54	Durham	Short Term (2012-2020)	
Install crosswalks with pedestrian-activated flashers and expand refuge islands.	US 15-501 on/off ramps	Chapel Hill	Short Term (2012-2020)	$40,000
Extend the solid marking designating the westbound exclusive right turn lane for US 15-501 on–ramps to minimize weaving movements at interchange and increase safety for on-road bicyclists.	From SB US 15-501 on ramp to 500 feet to the east	Chapel Hill	Short Term (2012-2020)	$2,700,000
Provide a minimum 5-foot wide on-road bicycle lane by restriping travel lanes to be 11 feet wide and making minor median modifications.	NC 54 from Burning Tree Dr/ Finley Golf Course Rd to the west	Chapel Hill	Short Term (2012-2020)	
Modify sloped abutment wall to provide 8-foot wide sidewalk behind overpass structural piers.	NC 54 underneath US 15-501 overpass	Chapel Hill	Short Term (2012-2020)	
Pave road shoulders to accommodate bicyclists on select roads to provide connections to the American Tobacco Trail.	From NC 54 to the American Tobacco Trail via Barbee Chapel Rd, Farrington Rd, Stagecoach Rd, NC 751, and Massey Chapel Rd	Durham	Short Term (2012-2020)	$4,000,000

PEDESTRIAN AND BICYCLE				
Description	**Location**	**Jurisdiction**	**Phase**	**Cost[1]**
Ensure adequate facilities for pedestrians and cyclists are available. Provide a 5-foot wide bicycle lane where possible, or provide "share the road" signage and a paved shoulder or sharrow markings for on-road bicycle travel. Many of the collector streets are designed with for low vehicular speeds with the intent for bicycles to share the travel lane. Fill in sidewalk gaps. [3]	Farrington Road through the study area (Old Chapel Hill Rd to Stagecoach Rd)	Durham	Short Term (2012-2020)	Variable cost. Paving five-foot wide bike lanes on both sides of the roadway would cost approximately $1,200,000 per lane assuming medium duty pavement. Striping a bike lane without paving would cost approximately $5,000 per mile. Installing signage would cost about $1,500 per sign. Installing sidewalks would cost about $265,000 per mile.
	Ephesus Church Rd from Farrington Rd to E Franklin St	Durham & Chapel Hill	Short Term (2012-2020)	
	George King Rd & Crossland Dr (proposed collector street) from Ephesus Church Rd to NC 54	Durham	Short Term (2012-2020)	
	SW Durham Dr from Ephesus Church Rd to NC 54	Durham & Chapel Hill	Short Term (2012-2020)	
	Lancaster Dr and E/W collector street from Farrington Rd to Pinehurst Dr	Durham & Chapel Hill	Short Term (2012-2020)	
	Pinehurst Dr from Ephesus Church Rd to Burning Tree Dr	Chapel Hill	Short Term (2012-2020)	
	Burning Tree Dr from Pinehurst Dr to NC 54	Chapel Hill	Short Term (2012-2020)	
	Hamilton Rd from NC 54 to Cleland Dr	Chapel Hill	Short Term (2012-2020)	
	Cleland Dr from Burning Tree Dr to US 15-501	Chapel Hill	Short Term (2012-2020)	
Construct Little Creek Trail to connect Meadowmont Trail to Lancaster Drive.	Meadowmont Trail at Rashkis Elementary School	Chapel Hill	Short Term (2012-2020)	TBD
Widen the existing bicycle path to a 15-foot wide shared use path.	Along the east side of US 15-501 from Cleland Rd to S Estes Dr	Chapel Hill	Short Term (2012-2020)	TBD
Construct the Bolin Creek Greenway connection to Pinehurst Dr.	Bolin Creek Greenway	Chapel Hill	Short Term (2012-2020)	TBD

PEDESTRIAN AND BICYCLE				
Description	**Location**	**Jurisdiction**	**Phase**	**Cost[1]**
Construct an off-road shared-use path, with a boardwalk bridge as an alternative solution in environmentally sensitive areas. Path should have minimum 10-foot width; ideally 15 feet if possible.	Along NC 54 from E Barbee Chapel Rd to I-40 overpass	Durham & Chapel Hill	Mid-Term (2020-2025)	The cost for these improvements is included in the roadway projects list under the item "Widen NC 54 to six lanes in the Durham section. Construct the multi-use path concurrent with the road project."
	Along the NC 54 frontage to connect to the existing multi-use path at Burning Tree Dr	Chapel Hill	Mid-Term (2020-2025)	
Construct pedestrian facilities with ramps at Falconbridge Rd and Farrington Rd bridges over NC 54	Falconbridge Rd & Farrington Rd	Durham	Mid-Term (2020-2025)	
Construct sidewalk on south side of NC 54 to connect to I-40 overpass.	South side of NC 54 from Huntingridge Rd east to I-40 overpass	Durham	Mid-Term (2020-2025)	
Construct a 10-foot wide shared use path on south side of overpass.	NC 54 bridge over I-40	Durham	Mid-Term (2020-2025)	
Implement crosswalks and landscaped median refuges at superstreet intersections.	Huntingridge Rd & NC 54	Chapel Hill	Mid-Term (2020-2025)	The cost for these improvements is included in the roadway projects list under the item "Construct EB NC 54 to EB I-40 flyover from Farrington Road to I-40 EB on-ramp."
	Meadowmont Ln/ Friday Center Dr & NC 54	Durham	Mid-Term (2020-2025)	
Design and construct light rail bridge over NC 54 to serve as an elevated pedestrian crossing.	Across NC 54 connecting Meadowmont and Friday Center	Chapel Hill	Long Term (2025-2035)	TBD
Construct Southwest Rail Trail along light rail alignment during light rail construction.	Along future light rail corridor	Durham & Chapel Hill	Long Term (2025-2035)	TBD
Construct US 15-501 underpass to connect Bolin Creek Greenway.	S Estes Dr & US 15-501	Chapel Hill	Long Term (2025-2035)	TBD
Continue to make regional connections with greenways	where possible	Durham & Chapel Hill	Long Term (2025-2035)	variable cost

1 Cost estimates do not include right-of-way, utilities or escalation.

2 Crosswalks, refuge islands, pedestrian signals and street lighting can be installed with developer mitigation funds. They may also be implemented concurrently with road maintenance projects such as resurfacing, or as part of more substantial road improvements (i.e., construction of the superstreet intersections)

3 Although it may not be feasible to provide bike lanes or paved shoulders and construct sidewalks on all of these roads within the next five years, these recommendations should remain a priority and should be constructed as soon as funds are available.

ROADWAY				
Description	**Location**	**Jurisdiction**	**Phase**	**Cost[1]**
Construct Farrington Rd slip ramp for northbound traffic on Farrington Rd to access eastbound I-40 directly. Modify on-ramp to allow for transition.	Farrington Rd	Durham	Short Term (2012-2020)	$3,400,000
Construct collector street system including turn lanes on NC 54.	As specified in the adopted Southwest Durham – Southeast Chapel Hill Collector Street Plan	Durham	Short Term (2012-2020)	$31,400,000
Construct access road behind the Farrington Road shopping center for connection between Farrington Rd and Falconbridge Rd.	Between Farrington Rd and Falconbridge Rd	Durham	Short Term (2012-2020)	$400,000
Obtain Marriot Way, then upgrade to NCDOT standards and extend to Barbee Chapel Rd.	Between Friday Center Dr and E Barbee Chapel Rd	Chapel Hill	Short Term (2012-2020)	$800,000
Construct other connections as opportunities arise through development proposals.	Through study area	Durham & Chapel Hill	Short to Long Term	Variable cost
Close Glenwood Square shopping center driveways along NC 54 and provide access via Hamilton Rd	Glenwood Square Shopping Center at US 15-501 interchange	Chapel Hill	Short Term (2012-2020)	$100,000[3]
Construct dual exit lanes for I-40 WB to NC 54 WB loop ramp plus two thru lanes on NC 54 WB. Widen bridge for four EB lanes, three WB lanes, and 10-foot sidewalk on south side.	I-40 Interchange with NC 54	Durham	Mid-Term (2020-2025)	$6,100,000[4]
Add new partial cloverleaf ramp for I-40 EB to NC 54 EB, remove existing signal and install yield sign at the I-40 EB to NC 54 WB ramp. Reconfigure EB approach at I-40 EB on-ramps for two free-flow lanes to EB I-40.	I-40 Interchange with NC 54	Durham	Mid-Term (2020-2025)	$2,100,000
Widen NC 54 to six lanes east of Barbee Chapel Rd to match six lane section to the west. Construct the multiuse path concurrent with the road project.	Barbee Chapel Rd to I-40 Interchange	Durham	Mid-Term (2020-2025)	$22,700,000
Implement superstreet configuration at Crossland Drive.	Future western collector street[5] & NC 54	Durham	Mid-Term (2020-2025)	$3,900,000
Convert Farrington Rd intersection to an overpass over NC 54 with pedestrian facilities.	Farrington Rd at NC 54	Durham	Mid-Term (2020-2025)	$6,500,000
Convert Falconbridge Rd intersection to a grade separated interchange with pedestrian facilities.	Falconbridge Rd at NC 54	Durham	Mid-Term (2020-2025)	$9,800,000

ROADWAY				
Description	**Location**	**Jurisdiction**	**Phase**	**Cost[1]**
Implement superstreet configuration at Meadowmont Ln/ Friday Center Dr.	Meadowmont Ln/ Friday Center Dr & NC 54	Chapel Hill	Mid-Term (2020-2025)	$4,300,000
Construct Barbee Chapel RdgGrade separation.	Barbee Chapel Rd & NC 54	Chapel Hill	Mid-Term (2020-2025)	$9,200,000
Construct partial cloverleaf redesign of US 15-501 interchange.	US 15-501& NC 54 interchange	Chapel Hill	Long Term (2025-2035)	$17,300,000
Implement superstreet configurations at W Barbee Chapel Rd and Burning Tree Dr/ Finley Golf Course Rd.	NC 54 intersections with W Barbee Chapel Rd and Burning Tree Dr/ Finley Golf Course Rd	Chapel Hill	Long Term (2025-2035)	$4,900,000

1 Cost estimates do not include right-of-way, utilities or escalation.

2 Cost estimates include fourth travel lane on eastbound I-40 to bridge across creek prior to NC 751 interchange. Recommended to extend travel lane to NC 751 interchange.

3 Cost estimates do not include right-of-way damages.

4 Cost estimate extends from I-40 ramps to Leigh Farm Rd/Quadrangle Dr.

5 Crossland Drive refers to the future western collector street. Throughout the study process, public citizens raised concerns over the Crossland Drive alignment and proposed George King as a future collector street. The superstreet configuration is recommended for whichever road alignment becomes the collector street.

RENAISSANCE PLANNING GROUP

Baker

ICF INTERNATIONAL

Executive Summary Addendum

Addendum #1

Figure ES-1 revised to label light rail alignments as C-1 and C-2, and to denote C-2 as the preferred alignment. See revised figure on following page. Return to previous

Addendum #2

Page E-5, insert the following paragraph after the first paragraph:

Mixed-use centers that include higher intensity and density of uses than is typically seen in a suburban pattern can help mitigate automobile travel by enhancing opportunities for walking, biking, and transit. However, any new development that incorporates large amounts of impervious surface and automobile traffic can also have negative impacts on the Little Creek Significant Natural Heritage Area (SNHA) and the wildlife supported by this natural area. To mitigate the environmental impacts of new development, every effort should be made to provide a buffer between the newly developed area and the SNHA, including the preservation of large, continuous areas of open space and the preservation of wetlands, floodplains, and riparian corridors. Return to previous

Addendum #3

Page E-6, fourth paragraph, the following provided for clarification:

At the February 8, 2012 meeting, the DCHC Transportation Advisory Committee (TAC) voted to approve the Locally Preferred Alternative (LPA) for the Durham-Orange Transit Corridor indicating that both C-1 and C-2 will be carried forward for further study, with a preference for option C-2. Return to previous

Addendum #4

Table ES-2, Leigh Village Future Light Rail Station, the following updated information is provided:

Recent findings by Triangle Transit during the light rail alternatives analysis suggested a need for over 1000 parking spaces at the proposed Leigh Village transit station. While this number is higher than that originally proposed for the NC 54 Corridor Study, it is important to size this park-and-ride lot appropriately in order to meet the projected demand. The final analysis for the LRT will make a recommendation on the final sizing requirements for all LRT park-and-ride facilities. If the final recommendations support a need for over 1000 spaces at the Leigh Village park-and-ride, the Transportation Advisory Committee (TAC) recommends design elements to mitigate the visual and land use affects for a deck this size. For example, a land use pattern that surrounds the deck with private development, placing retail and support services between the deck and the LRT platform not only enhances the economic vitality of the station area, but also provides travelers with various support services. Wrapping a parking structure with residential, office and/or commercial uses, as shown in the photo below, will minimize the visual affects of the deck while providing additional opportunities for economic activity.

Source: http://www.cnu.org/resources/projects/15th-pearl-mixed-use-structure-2006

Additionally, the DCHC MPO will continue to pursue other strategies for addressing park-and-ride solutions for the NC 54 Corridor, including a greater and more dispersed number of park-and-ride facilities and continued travel demand management (TDM) programs.

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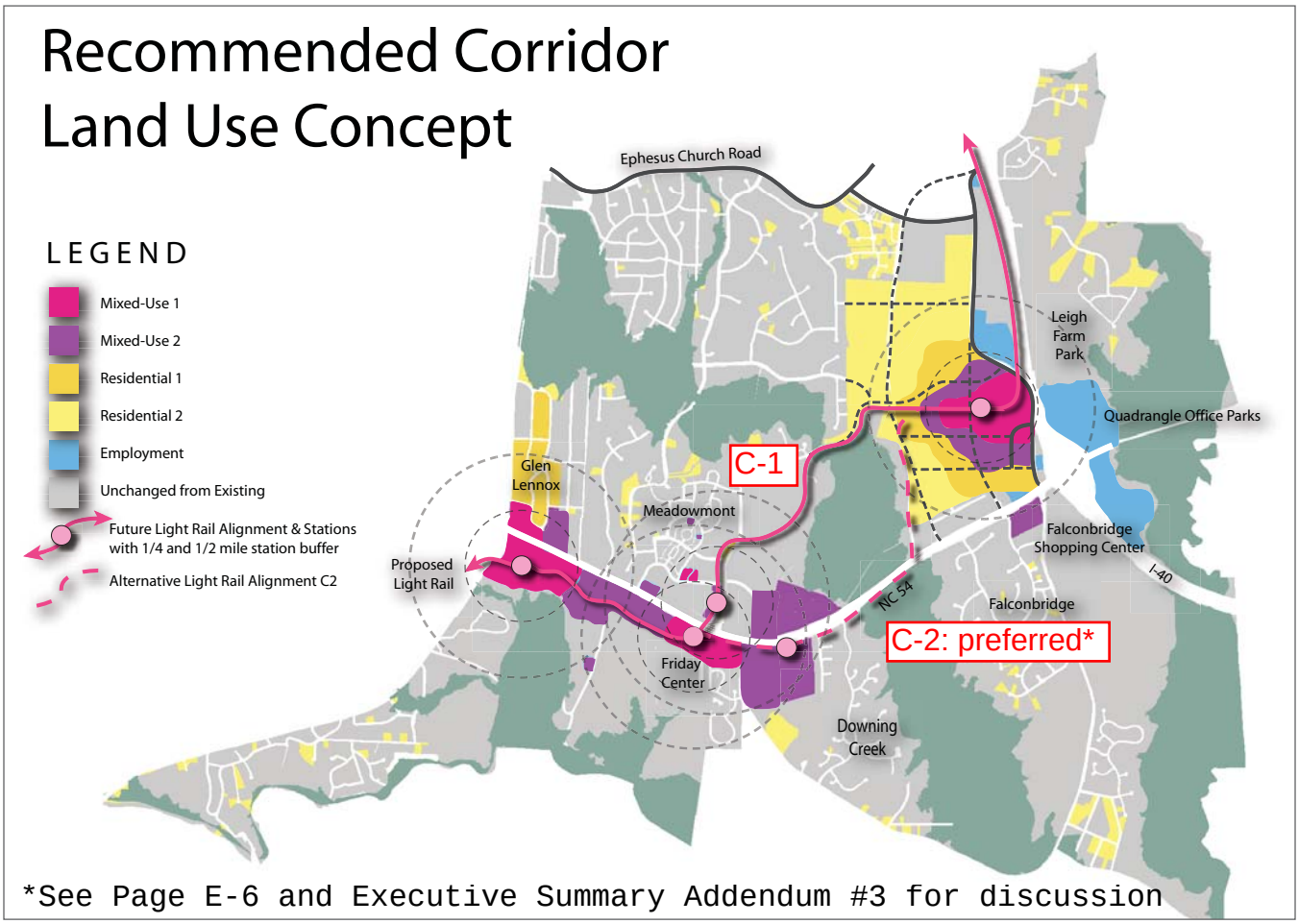

Figure ES-1: Recommended Corridor Land Use Concept Revised April 16, 12

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Table ES-1: Concept Land Uses

	Mixed Use 1	Mixed Use 2	Residential 1	Residential 2	Employment
No. of Stories	3 - 8	2 - 4	2 - 4	1 - 3	4 - 12
Floor-to-area ratios (non-residential)	1.25 - 2.25	1.0 - 1.5	-	-	0.5 - 1.0
Dwelling Units per Acre	35 - 60	20 - 35	12 - 35	6 - 12	-
Employees per Acre	45 - 90	25 - 50	9 - 15	6 - 12	35 - 175